

#2342

BIOLOGICAL EVALUATION - HEMLOCK SAWFLY  
SOUTH TONGASS NATIONAL FOREST  
KETCHIKAN RANGER DISTRICT  
OCTOBER 1972

The purpose of this report is to describe damage from hemlock sawfly defoliation in 1972 and an estimated population trend for 1973 in an outbreak near Ward Lake northwest of Ketchikan. The report is based on aerial sketchmapping done by Don Curtis in September and an examination of defoliated trees that he conducted with the assistance of Forest Insect Research in October 1972.

Defoliation in the Ward Lake area has been compounded by saddle-backed looper feeding which subsided in 1969 and, more recently, a rising blackheaded budworm infestation in the area.

Ground surveys included an assessment of damage to tagged trees on four 1 X 2-chain plots established in 1970. These plots were located in stands of western hemlock that had been defoliated by saddle-backed looper and hemlock sawfly populations during the summer of 1969. Four additional 1 X 2-chain plots were located in a stand of recently defoliated western hemlock along the northwest side of Ward Lake. As a third measure, a sequential sampling of hemlock sawfly egg populations was conducted at three locations along the Harriet Hunt access road using a technique recently developed by Forest Insect Research.

A separate system of one-fifth acre plots also provides a basis for comparing the severity of this infestation with other insect populations levels throughout southeast Alaska.

I. Technical Information

Causal Agent: Neodiprion tsugae Midd.; hemlock sawfly

Host Tree: Tsuga heterophylla (Raf.) Sarg., western hemlock

Location of Outbreak: In the Ward Creek drainage along the northwest side of the valley occurring in spotty distribution over approximately 1,100 acres and extending 4.5 miles upstream from Ward Cove. An additional outbreak occurs to the northwest in the adjacent Whipple Creek drainage. The combined infestations, as determined from aerial observations on a 1:63,360 scale map, amounts to 1,500 acres (see attached map).

Type of Damage: Light to severe defoliation of western hemlock resulting in varying amounts of top-killing and tree mortality concentrated primarily on the south and west facing slopes. The largest area of heavy defoliation, amounting to 250 acres, occurs along the north and west sides of Ward Lake. Additional moderate to severe defoliation, occurring in the Whipple Creek drainage, has resulted in some top-killing and tree mortality in areas where defoliation had occurred in 1969-1970.

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## II. Procedure

Five classes of damage based on amount of crown foliage present were recognized. The damage classes used in the evaluation survey and their descriptions are as follows:

1. Light - less than 25 percent of the old foliage is absent. The crown has a greenish appearance. Any foliage loss is classified as light.

2. Moderate - foliage loss is between 26-50 percent. The upper crown usually appears greenish brown.

3. Heavy - foliage loss is between 51-75 percent. The upper crown and portions of the lower crown appear mostly brown. Some top-killing and tree mortality are associated with this degree of defoliation.

4. Severe - foliage loss is more than 75 percent. The entire crown is thin and has a grayish-purple appearance. The green foliage present consists primarily of the current year's growth. Top-killing or tree mortality results from this degree of defoliation.

5. Dead - no foliage present, however, branches, twigs, and most twiglets remain. The cambium is moist, but beginning to sour. Basal examination reveals the presence of secondary insects.

The presence of hemlock sawfly populations was determined by felling randomly selected trees and examining foliage samples taken from the mid-point of the upper crown for the presence of sawfly eggs. Foliage samples were taken from areas which were lightly, moderately, and heavily defoliated. A copy of the sequential sampling of hemlock sawfly eggs in southeast Alaska is attached.

## III. Summary of Evaluation

Defoliation levels and crown classes of plot trees were recorded in 1970. Overall tree condition was recorded for each tree following the 1972 growing season. The 74 trees examined were defoliated in 1970 as follows:

<u>Defoliation Class</u>	<u>Percent Tree Defoliation</u>	<u>Percent of Trees In Class</u>
I	1-25	5.4
II	26-50	24.3
III	51-75	24.3
IV	76-100	46.0
	Total	100.0

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Tree condition in 1972 was recorded as follows:

<u>Tree Condition Class</u>	<u>Percent of Trees in Class</u>	<u>Number of Trees</u>
Dead	28	21
Top-killed	18	13
*Unthrifty	20	15
Normal	34	25
Total	100	74

\*Less than 50 percent of foliage remaining

The following tables compare original defoliation and crown class with ultimate tree condition.

<u>Crown Class</u>	<u>Percent of Trees in Class that Died</u>	<u>Number of Trees</u>
Suppressed	27	4
Intermediate	26	7
Codominant	27	4
Dominant	35	6
Total		21

<u>Defoliation Class</u>	<u>Percent of Trees in Class that Died</u>	<u>Number of Trees</u>
I	0	0
II	6	1
III	0	0
IV	59	20
	Total	21

<u>Crown Class</u>	<u>Percent of Trees in Class with Top-killing</u>	<u>Number of Trees</u>
Suppressed	13	2
Intermediate	22	6
Codominant	27	4
Dominant	6	1
Total		13

4.

<u>Defoliation Class</u>	<u>Percent of Trees in Class with Top-killing</u>	<u>Number of Trees</u>
I	0	0
II	6	1
III	33	6
IV	18	6
	Total	13

The additional plots established in 1972 near Ward Lake revealed the following evidence of defoliation.

<u>Defoliation Class</u>	<u>Percent Tree Defoliation</u>	<u>Percent of Trees</u>
I	1- 25	29
II	26- 50	22
III	51- 75	18
IV	76-100	28
V	100 and tree dead	3
	Total	100

Tree condition has been recorded.

<u>Crown Class</u>	<u>Percent of Trees in Class</u>	<u>Number of Trees</u>
Suppressed	28	21
Intermediate	30	23
Codominant	20	15
Dominant	22	17
Total	100	76

It is emphasized that mortality and top-killing recorded in 1972 are identified in the above data with defoliation at the end of 1970. Not quantified yet influential in affecting tree condition, are defoliation levels in 1971 and 1972.

#### IV. Discussion

The results of this evaluation indicate that considerable damage has resulted from the current sawfly feeding and that high larval population of both the hemlock sawfly and the blackheaded budworm are likely to occur in 1973. The damage appraisal on the four plots established near Ward Lake and considered to be representative for all areas of heavy to severe defoliation within the Ward Creek drainage revealed that approximately one-half of the overstory trees have been defoliated in excess of 50 percent.

The Connell Lake "tree mortality plots" indicate that a high percentage of the heavily and severely defoliated hemlock trees die or sustain top-killing. It is conservatively estimated that 25-30 percent of the hemlock overstory on 500 acres will probably die even if no additional feeding occurs in 1973.

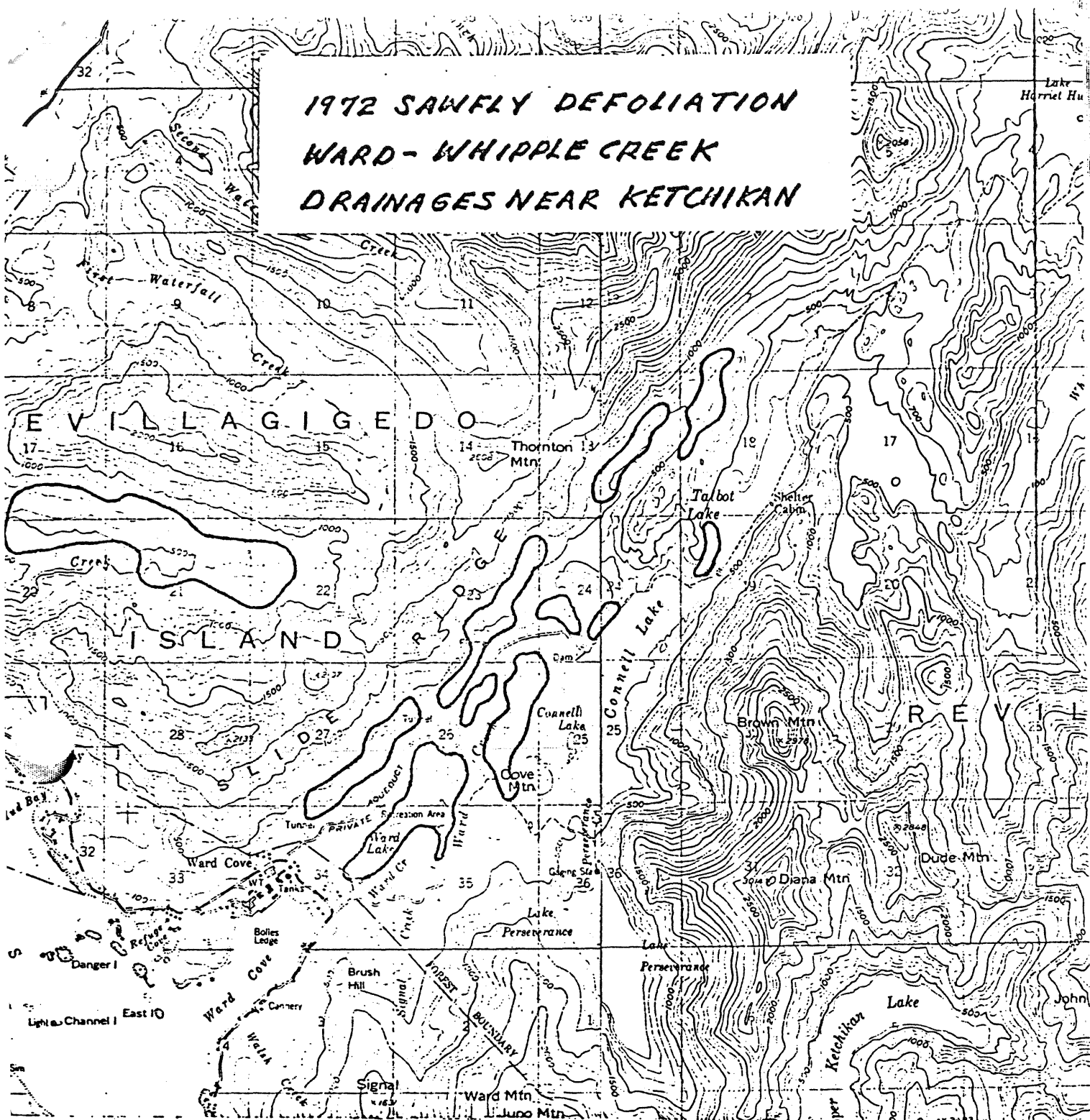
A direct comparison between the 1969 looper-sawfly feeding and the 1973 sawfly feeding is not completely valid because the two insects may not cause the same kind of damage to trees. Loopers are more general feeders while sawflies select older foliage. However, it is reasonable to assume from past observation that hemlock which have been severely defoliated by any needle feeder are likely to die or sustain top-killing.

An examination of foliage from felled trees indicates that a moderate to heavy population of sawfly will occur in the same areas in 1973. In addition, blackheaded budworm eggs were observed on all the foliage sampled and in one area where sawfly eggs were not found. A realistic correlation between egg counts and subsequent damage by the next season's larval population is not available. However, it is reasonable to assume that some feeding will occur in the existing areas of defoliation and that additional light to moderate feeding will occur in adjacent areas in 1973.

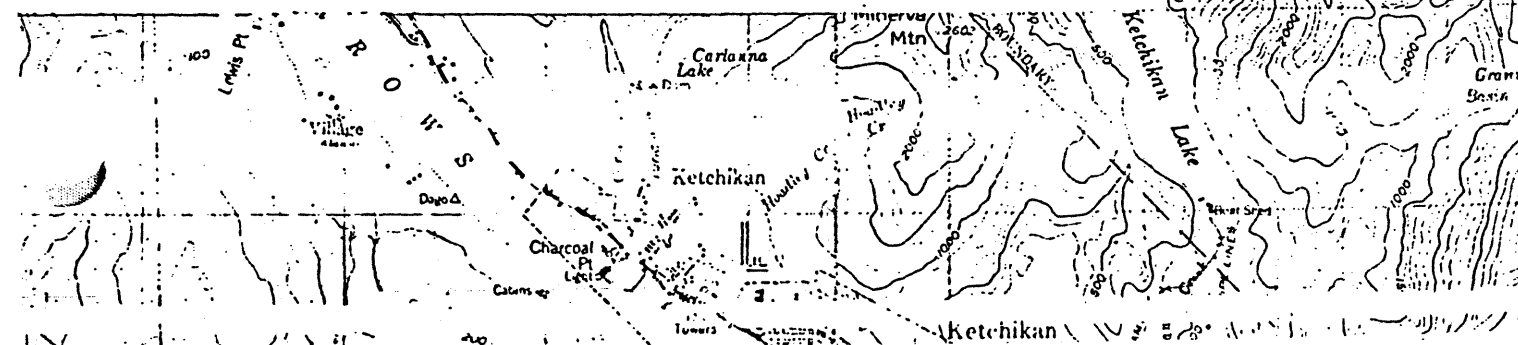
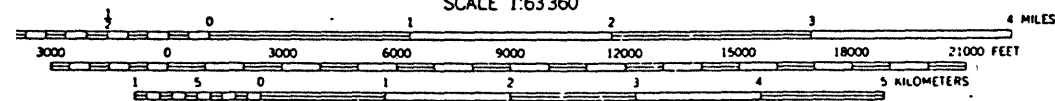
Starvation of sawfly and budworm larvae will probably occur in areas that were heavily defoliated this past summer. However, this will not occur in time to prevent additional damage. High egg counts in areas of light to moderate defoliation indicate that populations are generally on the increase. No overall reduction in larval populations is expected next summer, unless weather or biotic factors--disease or parasites--take a heavy toll. Fairly extensive top-killing and some concentrated tree mortality is expected to occur over several hundred acres in the Ward Creek drainage next year.

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Region 10

1972 SAWFLY DEFOLIATION  
WARD-WHIPPLE CREEK  
DRAINAGES NEAR KETCHIKAN



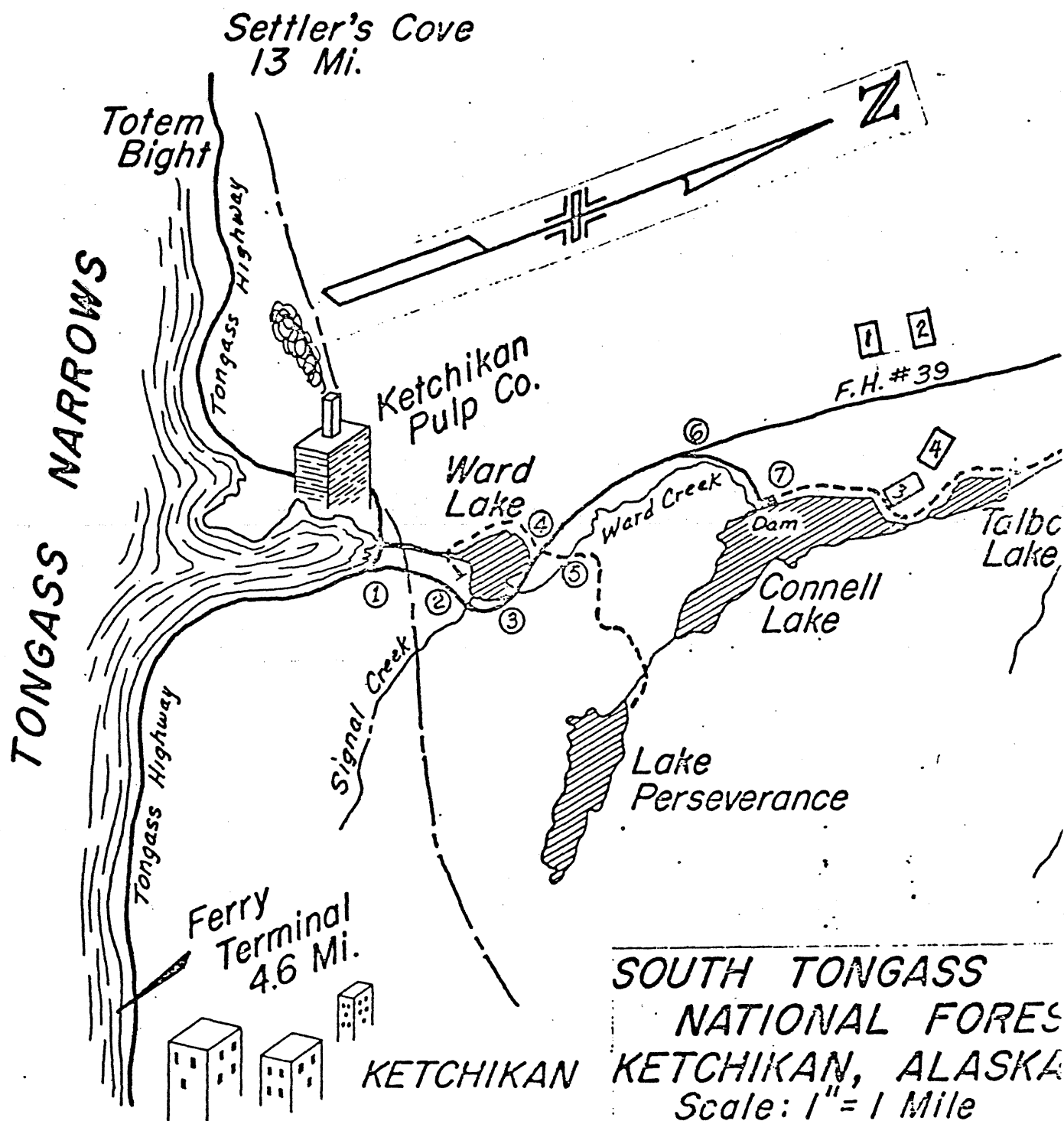
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# RECREATION AREAS

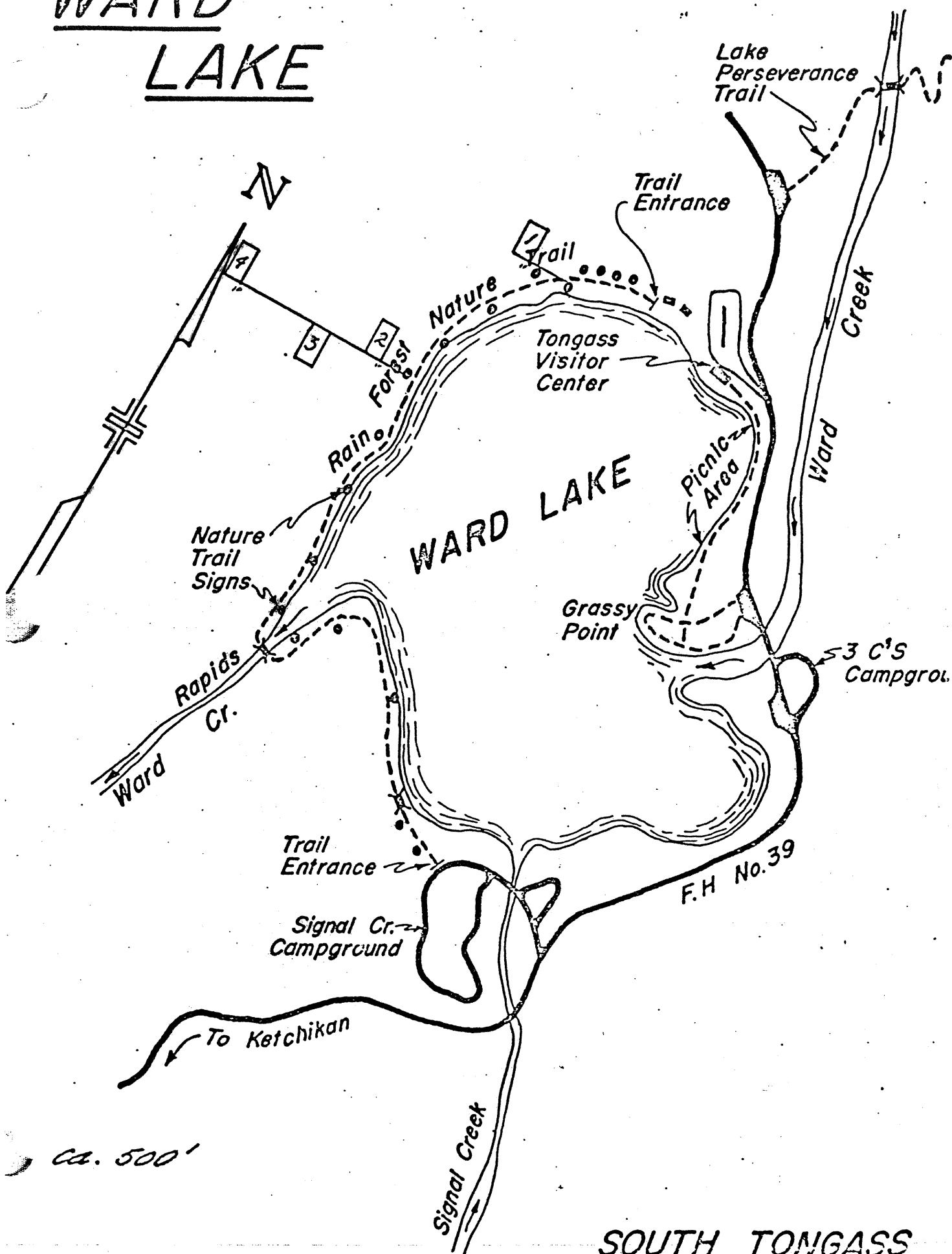
## WARD LAKE - LAKE HARRIET HUNT

Location of 1970 saddle-backed  
looper and hemlock sawfly star  
mortality plots.



LOCATION OF 1972 PERSEVERANCE SURVEY MONUMENTAL PLAT.

# WARD LAKE



SOUTH TONGASS